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ABSTRACT

A causal model based on Tinto's work was employed to explain the long-term persistence/withdrawal of students who began their postsecondary education in two-year institutions. Persistence was defined as completing the bachelor's degree within a 9-year period, or actively working toward the degree as of 1980. The model was estimated on a national sample of 825 students who initially enrolled in 85 two-year institutions in fall 1971. Although there were differences in the factors associated with persistence for men and women, the results tend to confirm the importance of person-environment fit as a salient influence on degree persistence/completion. Measures of academic and social integration had the most consistent pattern of positive direct effects, while much of the influence of student pre-college traits was indirect. That is, the student's experience of college may have an important, unique influence on persistence beyond that of differences in family background, secondary school experiences, individual attributes, and initial commitments on college entry. Subsequent institutional commitment had a significantly stronger positive influence on persistence for men than for women. Conversely, level of secondary school social involvement was significantly more important positive influence on persistence for women than for men. (Author/SW)

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Long-Term Persistence of Two-Year College Students

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This paper was presented at the Annual Meeting of the Association for the Study of Higher Education held at the Gunter Hotel in San Antonio, Texas, February 20-23, 1986. This paper was reviewed by ASHE and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC collection of ASHE conference papers.

Abstract

This paper employed a theoretical model to explain the long-term persistence of students who began their post-secondary education in two-year institutions. The model was estimated on a national sample of 825 students who initially enrolled in 85 two-year institutions in the fall of 1971, and were followed over a nine-year period. Although there were differences in the factors associated with persistence for men and women, the results tend to confirm the importance of person-environment fit as a salient influence on degree persistence and completion in post-secondary education. Measures of academic and social integration had the most consistent pattern of positive direct effects, while much of the influence of student pre-college traits was indirect.

Student persistence/withdrawal behavior in post-secondary education has become an issue of considerable scholarly interest (e.g., Astin, 1975; Cope and Hannah, 1975; Lenning, Sauer and Beal, 1980; Pantages and Creedon, 1978; Ramist, 1981; Spady, 1970; Tinto, 1975). Recently, the National Institute of Education-sponsored "Study Group on the Conditions of Excellence in American Higher Education" (Mortimer, et al., 1984) further underscored the importance of this area for future inquiry by suggesting that student persistence in post-secondary institutions may be one salient indicator of educational impact or excellence.

The research literature on persistence/withdrawal behavior is voluminous (e.g., Pantages and Creedon, 1978; Tinto, 1975). Literally hundreds of studies have been conducted. The vast preponderance of this research, however, has been atheoretical and descriptive. The result has been a body of literature that lacked the cohesion and focus necessary to develop valid generalizations about those factors influencing the phenomenon. Recently, Tinto (1975), building on the earlier work of Spady (1970), has developed a theoretical, explanatory model of the student persistence/withdrawal process. This model, which assumes that persistence/withdrawal behavior is largely determined by the student's integration in the social and academic systems of the institution, has been a major theoretical advance in attrition research. It has brought theoretical direction to an area of inquiry sorely in need of focus.

Not surprisingly, Tinto's (1975) model has itself been the focus of considerable research over the past decade (e.g., Aitken, 1982; Baumgart and Johnstone, 1977; Bean, 1980, 1982, 1983, 1985; Munro, 1981; Pascarella and

Chapman, 1983; Pascarella and Terenzini, 1979, 1980, 1983; Terenzini and Pascarella, 1977, 1978; Terenzini, Pascarella, Theophilides and Lorang, 1983). The results of this research have generally supported the predictive validity of Tinto's model and the importance of the two core concepts of academic and social integration.

At the same time, however, the literature on the Tinto model is limited in a number of ways. First, with the exception of Pascarella and Chapman (1983) nearly all of the research guided by Tinto's model has been conducted at four-year, largely residential institutions. Consistent with the total body of existing research on persistence, those estimating Tinto's model have essentially ignored the large and growing population of students who begin their careers in post-secondary education in two-year or community colleges. As a result, beyond the fact that students who begin college in two-year institutions are significantly less likely to persist in higher education or to obtain their bachelor's degree than students who start at four-year institutions (Astin, 1982; Kohen, Nestle and Karmas, 1978), we know little or nothing about the factors which influence the persistence/withdrawal behavior of this important group of students.

A second limitation of existing research on the Tinto model is that it is largely confined to studies of student persistence/withdrawal behavior at single institutions and over a relatively short period of time (typically one or two years). This creates a particularly insidious methodological problem in the form of an ambiguous operational definition of persistence/withdrawal behavior. Students who withdraw from an institution before receiving a bachelor's degree may or may not be withdrawing from post-secondary education

generally. Some may be leaving the system permanently, others may be transfering to another institution and still others may be "stopping-out" (Cope and Hannah, 1975) for a period of time before returning to the original institution or to another institution to complete their degree. It is essentially impossible to distinguish permanent withdrawal (or dropout) from institutional transfer or stop-out behavior in the absence of multi-institutional samples which trace a student cohort well beyond a one, two or even four-year period.

This is particularly important in studying the persistence/withdrawal behavior of students who begin college at two-year institutions since persistence to the bachelor's degree requires transfer to another institution. If not followed over a sufficient period of time, such transfer behavior could be confused with dropping out of higher education permanently. Unfortunately, studies which trace two-year college students over a sufficient period of time to determine the various individual and institutional influences on their persistence/withdrawal behavior with reasonable accuracy are essentially absent from the attrition literature.

This paper sought to address these weaknesses in the literature by employing Tinto's (1975) model to explain the long-term persistence/withdrawal behavior of students who began higher education in two-year institutions. The model was estimated on a national sample of 825 students who initially enrolled in 85 two-year institutions in the fall of 1971. The sample was followed for a nine-year period from 1971 to 1980.

Causal Model

Tinto's (1975) explanatory, causal model of student persistence/withdrawal behavior in post-secondary education is both longitudinal and complex. It posits that students come to post-secondary institutions with a range of different background characteristics and secondary school experiences (e.g., race; sex; family social, educational and financial context; secondary school academic and social accomplishments). These background characteristics and secondary school experiences lead to initial student commitments to the institution to be attended and to the goal of graduation from college. Together with background characteristics and secondary school experiences, initial commitments influence the student's interactions with, and eventual integration into, the institution's academic and social systems. Other things being equal, the greater the individual student's levels of integration in the social and academic systems of the college, the greater his or her subsequent commitment to the college and to the goal of college graduation, respectively. In turn, these subsequent commitments are seen, along with levels of social and academic integration, as having a direct, positive influence on persistence. Figure 1 shows a conceptual schema of Tinto's (1975) model.

Insert Figure 1 About Here here

Tinto's (1975) model is largely based on the concept of the fit between the individual and the environment of the institution attended. Of all the constructs in the model the most salient to this core notion of person-environment fit are those of academic and social integration. It is through

these two constructs that the model assesses the nature of the student's institutional experience, and the relationship of this experience to subsequent commitments and to persistence/withdrawal behavior. As Tinto (1975, p. 96) himself suggests, "given individual characteristics, prior experiences and commitments, . . . it is the individual's integration into the academic and social systems of the college that most directly relates to his continuance at that college."

Method

The data were drawn from the 1971-1980 Cooperative Institutional Research Program (CIRP) surveys. The overall sample was 10,326 students attending 487 college and universities varying in type and control. The 10,326 students completed an initial survey upon entering college in the fall of 1971 which collected a broad array of student background information, aspirations and expectations of college. During the winter of 1980, approximately nine years later, the same students completed a follow-up instrument which collected extensive information about the student's actual collegiate experience. Details on the sampling scheme and design are discussed in Astin (1982).

The study sample was initially defined as those respondents who entered a two-year institution in 1971 as first-time students and who at that time aspired to a bachelor's degree or above. Respondents were excluded if they had missing data on any of the model's constructs (operationally defined in the next section of the poper). This yielded a sample of 825 students (418 men and 407 women) who had enrolled in 1971 in 85 two-year institutions.

Variables

As indicated by Figure 1, Tinto's conceptual schema portrays five different constructs or variable sets in a causal sequence: (a) background characteristics (i.e., family background, individual attributes, precollege schooling); (b) initial commitments (i.e., precollege commitment to the goal of college graduation and commitment to the initial institution attended); (c) academic and social integration; (d) subsequent goal and institutional commitments; and (e) persistence/withdrawal behavior.

Each background characteristic was operationally defined as follows:

Family background. Three variables were used to operationalize this characteristic. The first was termed socioeconomic status (SES), which was the sum of parents' combined level of education (six categories from "grammar school or less" to "postgraduate degree") and combined parental income (twelve categories from "less than $4,000" to "$40,000 or more"). The second was degree of concern about financing college. This was coded: 3 = major concern; 2 = some concern; 1 = no concern. The third family background variable also reflected economic status. It was the student's expectation that he or she would have to work during college (termed: work expectations). The variable was coded: 4 = very good chance to 1 = no chance.

Individual attributes. These were operationalized according to sex (1 = male, 2 = female); age (eight categories from "16 or younger" to "26 or older"); ethnicity (1 = non-minority/Caucasian, 0 = minority); expected major (1 = liberal art/sciences, 0 = pre-professional) and marital status (2 = married in 1971, 1 = not married in 1971).

Precollege schooling. Precollege schooling was measured by two variables: secondary school achievement and secondary school social accomplishments. Secondary school achievement was the sum of secondary school grades (1 = D to 8 = A or A+) and secondary school rank (1 = 4th quarter to 4 = top quarter). Secondary school social accomplishments were the sum of five secondary school social/leadership activities (e.g., president of a student organization, won a varsity letter, participated in a play); coded 1 = no; 2 = yes.[1]

As with all background characteristics, the initial commitment items were collected on the 1971 pre-enrollment survey and were termed: goal commitment I and institutional commitment I. These two variables were operationally defined as follows:

Goal commitment I. This was a single item: highest expected academic degree (coded: 3 = bachelors, (B.A.), to 5 = Ph.D., M.D., J.D., DDS or their equivalent).

Institutional commitment I. This was the sum of two items: (a) expectation that the student would be satisfied with the college in which he or she was about to enroll, and (b) the expectation that the student would transfer from that college prior to enrollment. Each item was coded: 1 = no chance to 4 = very good chance, with the transfer item coded in reverse.

According to the Tinto model, academic integration is determined primarily by the student's academic performance and intellectual development, whereas social integration is primarily a function of student interactions with faculty and peers. In the present study the integration variables were defined as follows:

Academic integration. This was the sum of two items: (a) average undergraduate grades (coded: 1 = "D or less" to 6 = "A- or more"); and (b) membership in a scholastic honor society (coded: 1 = no; 2 = yes).[1]

Social integration. This was the sum of five items assessing the student's involvement with peers and faculty ("knew a professor or administrator", "president of one or more student organizations", "had a major part in a play," "won a varsity letter", and "edited a school publication"); coded (1 = no, 2 = yes).[2]

As hypothesized by the Tinto model, academic and social integration have a direct influence on subsequent levels of commitment to graduation and to the institution. In a number of extant studies subsequent goal commitment is measured largely by degree aspiration (e.g., Pascarella, Duby and Iverson, 1983; Munro, 1981). In the present study, however, the dependent variables were largely defined by degree completion. Thus, including a measure of degree aspiration assessed on the 1980 follow-up as an operational definition of subsequent goal commitment was essentially redundant with the dependent measure. Consequently, subsequent goal commitment was not represented in the present estimation of the model.

As it has been operationally defined in previous studies of the Tinto model, the concept of subsequent institutional commitment to a large extent reflects overall satisfaction with the institution attended (e.g., Munro, 1981; Pascarella, Duby and Iverson, 1983; Pascarella and Terenzini, 1983). Consistent with previous research, the present study also operationally defined subsequent commitment in terms of satisfaction with college. Institutional commitment/satisfaction II was operationally defined as the

student's response to a single item: "Overall, how satisfied were you with the last undergraduate college attended?" (coded: 3 = very satisfied; 2 = somewhat satisfied; and 1 = not at all satisfied).

Responses to the items constituting academic integration, social integration and institutional commitment/satisfaction II were all collected on the 1980 follow-up survey. They refer to the student's experience in the last undergraduate college attended.

There were two dependent measures of persistence/withdrawal behavior in the study: (a) degree persistence, and (b) degree completion. The first persistence measure, degree persistence, was operationally defined as completion of at least a bachelor's (B.A.) degree within the nine-year period 1971-80, or currently working toward a bachelor's degree as of the 1980 follow-up. Conversely, dropout or withdrawal was defined as failing to complete a bachelor's degree within the nine-year period 1971-1980 and not actively working toward a bachelor's degree as of 1980. The second persistence measure, degree completion, was operationally defined as completion of at least a bachelor's degree within the nine-year period 1971-1980. Withdrawal or dropout was defined as failure to complete a bachelor's degree within the 1971-1980 period.

While it is acknowledged that these two depended measures are likely to be highly correlated, it is nevertheless possible that they may be tapping somewhat different aspects of persistence in the system of post-secondary education. Completion of the bachelor's degree over a specified period by two-year college students who initially aspired to that degree is a seemingly unambiguous measure of persistence in post-secondary education. Regarding

actual degree completion alone as a comprehensive measure of persistence, however, would classify those still actively working toward the bachelor's degree as dropouts or withdrawals. It is not immediately apparent that such a classification is inherently accurate. One could argue, for example, that an individual who initially enrolled in a two-year college in 1971 but didn't receive his or her bachelor's degree until 1991 was still a persister in the post-secondary education system.

Clearly, there may be no ideal solution to the problems involved in defining persistence in post-secondary education. Any single definition of persistence/withdrawal is unlikely to be completely satisfactory. Consequently, we judged it most appropriate to estimate the model for both operational definitions of persistence/withdrawal behavior.

Data Analysis

Recent findings reported by Pascarella and Terenzini (1983) have suggested the possibility of significant sex differences in the factors influencing persistence/withdrawal behavior. Accordingly, a series of preliminary analyses was conducted to determine if sex interacted with any of the model's constructs in the prediction of persistence. This was accomplished by regressing each persistence measure on an equation consisting of all independent variables plus a set of terms which cross multiplied sex with each independent variable. In both equations the set of cross product terms was associated with a significant ($p < .05$) increase in R^2. Significant individual interactions were indicated for sex X secondary school social accomplishment and sex X institutional commitment/satisfaction II. Such findings suggest the appropriateness of estimating the model separately for men and women.

Coefficients in the causal model were estimated separately for men and women with ordinary least squares regression. According to the model, student background characteristics were considered exogenous variables (determined by influences outside the model), while initial commitments, social/academic integration, subsequent commitment and the persistence measures were considered endogenous (determined within the model). The analysis required the solution of seven structural equations in which each endogenous variable was regressed on all exogenous variables and all causally antecedent endogenous variables in the model. The results of these structural equations yielded standardized regression (beta) weights which can be interpreted as "direct effects" (Kerlinger and Pedhazur, 1973). The size and sign of the standardized regression weight indicates the amount of change in the dependent measure associated with every unit standard deviation increase in the predictor variable, holding constant the influence of all other predictors.[3,4]

RESULTS

Table 1 shows for men and women the means, standard deviations and intercorrelations for all variables. Nearly all subsequent analyses are based on these statistics. As Table 1 shows, 53% of both samples had completed their B.A. degree within the nine-year period. For men an additional 15% were still actively pursuing their undergraduate degrees (53% + 15% = 68%), while for women an additional 17% were still actively seeking the B.A.

Insert Table 1 about here

Table 2 summarizes the results of the structural equations for men while the corresponding set of structural equations for women is shown in Table 3. As equations 15 and 16 in the Tables show, the variables in the model, considered as direct effects, explained 19.9% of the variance in degree persistence and 25.4% of the variance in degree completion for men. For women the model accounted for 15.4% of the variance in degree persistence and 22.8% of the variance in degree completion. While modest, these percentages compare favorably with other multi-institutional validations of Tinto's (1975) model, which trace student persistence/withdrawal behavior over a substantially shorter period of time than the present investigation (e.g., Munro, 1981; Pascarella and Chapman, 1983).

Insert Tables 2 and 3 about here

As Tables 2 and 3 further show, for both men and women only three variables had significant direct effects on degree persistence controlling for the influence of all other variables in the model. For men the three variables with significant, positive, direct effects were academic integration, institutional commitment/satisfaction II and social integration. For women the variables with significant, positive direct effects on degree persistence were academic integration, social integration and socioeconomic status.

A quite similar pattern of significant direct effects was shown for the prediction of degree completion. For both sexes academic and social integration each had significant positive direct effects on degree completion. For men the other positive direct effects were institutional commitment/satisfaction II and secondary school academic accomplishment, while level of commitment to the initial two-year institution of enrollment was negatively associated with degree completion. Aside from academic and social integration, the only other variable to have a significant, positive direct on completion of the B.A. degree for women was secondary school social involvement.

As indicated previously, the magnitude of the direct effects on each measure of persistence for secondary school social accomplishment and institutional commitment/satisfaction II differed for men and women. Structural equations 16 and 17 in Tables 2 and 3 show that institutional commitment/satisfaction II had a substantially stronger positive influence on both measures of persistence for men than for women. Conversely, the influence on degree completion of secondary school social accomplishment was more strongly positive for women than for men.

Aside from secondary school academic achievement, secondary school social involvement, and socioeconomic status, none of the other student background characteristics had a significant direct effect on either persistence measure for either sex. Similarly, initial goal commitment failed to have a significant direct influence on degree persistence or degree completion. Since a number of background and initial commitment variables did, however, significantly influence variables which, in turn, had non-zero direct effects on persistence, it is important to examine indirect as well as direct effects.

Table 4 presents by sex the indirect effects of all variables in the model on the two persistence measures. (Based on Tinto's model, institutional commitment/satisfaction II has only a direct effect.) Indirect causal effects are estimated by the sum of the products of causal effects through intervening variables (Wolfle, in press). Based on the work of Sobel (1982), Wolfle and Ethington (1984) have developed an computer algorithm for the calculation of standard errors for indirect effects. Once these standard errors are calculated, the computation of significance tests (t-ratios) for indirect effects is relatively easy. Using this computer algorithm, the statistical reliability of the indirect effect of each predictor variable was computed. Thus, Table 4 not only shows the standardized and unstandardized indirect effects of each variable on persistence, but also indicates their statistical significance.

Insert Table 4 about here

As Table 4 shows, five variables had significant indirect effects on both persistence measures for men while only one variable had a significant indirect effect for women. For both sexes secondary school academic achievement had significant positive indirect effects on degree persistence and degree completion primarily through its significant, direct influence on academic integration at the last institution attended. For men the positive indirect effects of secondary school social involvement on both persistence measures were transmitted primarily through collegiate social integration. Being a white male had a positive indirect influence on persistence largely through institutional commitment/satisfaction II and academic integration. Finally, in addition to significant direct effects, male social and academic integration had significant positive indirect effects on persistence through their influence on institutional commitment/satisfaction II.

Because of the significance of social integration as a positive influence on both measures of persistence, an additional analysis was conducted which disaggregated the overall scale by specific type of social integration. In the first part of this analysis, partial correlations were computed between each persistence measure and each of the five types of integration constituting the social integration scale. These partial correlations controlled for every other predictor in the causal model with the exception, of course, of social integration. Subsequently, the five types of integration were substituted for the social integration scale in the direct effects equation, and the regression weights with each persistence measure were computed controlling for all other predictors and each of the other types of social integration.

The results of these analyses are summarized in Table 5. As the Table indicates, knowing a faculty member or administrator personally had the strongest significant partial associations with both degree completion and degree persistence for men. This variable also was the only one to have a significant positive regression weight with each persistence measure. For women a somewhat different pattern emerged. Editing school publications had significant, positive partial correlations with each persistence measure. Being president of a student organization had a positive partial correlation for female degree completion and a marginally significant ($p < .06$) partial correlation with degree completion.

Insert Table 5 about here

CONCLUSIONS AND DISCUSSION

This paper proposed a causal model, based on the work of Tinto (1975), to explain the long-term persistence/withdrawal behavior of students who initially enrolled in two-year institutions. Persistence/withdrawal behavior, as employed in the study, was essentially a measure of the student's persistence in, or withdrawal from the system of higher education. It was operationally defined in terms of completing, or persisting in the pursuit of the bachelor's degree. Degree completion was the completion of a bachelor's degree within the nine-year period 1971-1980. Degree persistence was operationally defined as completing a bachelor's degree within the nine-year period or actively working toward the bachelor's degree as of 1980. A fourteen variable model accounted for 19.7% of the variance in persistence in

pursuing the bachelor's degree for men and 15.3% of the variance in the corresponding persistence measure for women. The same model accounted for 25.4% of the variance in male bachelor's degree completion and 22.8% of the variance in female degree completion.

While these percentages are quite modest, they nevertheless compare favorably with other multi-institutional studies (e.g., Munro, 1981; Pascarella and Chapman, 1983) which trace persistence/withdrawal behavior over a substantially shorter period of time than the nine-year period covered by this investigation. Previous research has generally supported the predictive validity of Tinto's model for samples of students initially enrolling in four-year institutions. The present study suggests that the model is also reasonably useful in accounting for the long-term persistence/withdrawal behavior of individuals who begin their post-secondary education careers in two-year institutions.

Perhaps more significant than the overall variance percentages explained by the model, however, were the patterns of direct and indirect effects of variables in the model. Only four student background characteristics and initial commitments had significant direct effects on the two persistence measures, controlling for all other variables in the model. For men secondary school achievement had a positive direct effect on degree completion while male degree completion was negatively influenced by commitment to the initial institution of enrollment. For women socioeconomic status had a positive direct effect on degree persistence, while secondary school social involvement positively influenced degree completion. None of the background characteristics or initial commitments, however, had a consistent pattern of significant direct effects across both persistence measures and for each sex.

In line with theoretical expectations based on the model, the two variables with the most consistent pattern of significant positive effects on degree persistence and degree completion were academic and social integration. Indeed these two core concepts in Tinto's (1975) model were the only predictors to have significant direct effects on both persistence measures for men and women. Additional significant indirect effects were found for these variables on both male degree completion and persistence. Such findings tend to further underscore the concept of person-environment fit as an important determinant of persistence in post-secondary education. In this study students who initially enrolled in two-year institutions were significantly more likely to either obtain or persist in pursuit of the bachelor's degree if they became successfully integrated into the academic and social systems of the last institution attended. Conversely, students less successfully integrated in these components of the institutional environment were less likely to persist.

Previous research has suggested the salience of social and academic integration in predicting what is essentially the short-term, institutional persistence/withdrawal behavior of students initially enrolling in traditional four-year institutions (e.g., Munro, 1981; Pascarella and Terenzini, 1983; Terenzini and Pascarella, 1977, 1978). The present findings extend this work by suggesting the importance of these two core concepts in accounting for the long-term, post-secondary education persistence of students initially enrolling in two-year institutions.

Aside from providing further support for the saliency of person-environment fit as an influence on student persistence/withdrawal behavior,

the findings may also have potential policy implications. The relative importance of academic and social integration in predicting persistence suggests that what happens to a student after he or she enrolls at an institution may be as important to ultimate persistence in post-secondary education as the influence of pre-college variables.[5] In short, the student's experience of college may have an important, unique influence on system persistence beyond that of differences in family background, secondary school experiences, individual attributes, and initial commitments with which he or she enters college. Thus, it may be possible to enhance student persistence in post-secondary education through purposeful institutional policies and practices designed to enhance student social and academic integration.

Consistent with the findings of Pascarella and Terenzini (1983), the results of this study suggest significant differences in the factors influencing persistence for men and women. Subsequent institutional commitment had a significantly stronger positive influence on both persistence measures for men than it did for women. Conversely, level of secondary school social involvement was a significantly more important positive influence on both persistence measures for women than for men. Such findings suggest the importance of conducting separate analyses for men and women in future investigations of the factors influencing student persistence/withdrawal behavior. Pooling male and female samples may mask important differences in the patterns of effects on persistence.

The finding that degree of commitment to the last undergraduate institution attended had a significant, positive direct effect on persistence for men but not women is of some interest. For men, of course, the results

are quite consistent with theoretical expectations based on the model. Not only did subsequent institutional commitment/satisfaction positively and directly influence male persistence, but it also transmitted the positive indirect effects of male social and academic integration on persistence. For women, none of the corresponding direct or indirect effects were significant, which is inconsistent with the model's expectations.

It is somewhat difficult to compare these results with those of previous research since no existing studies have disaggregated men and women in two-year college samples. Pascarella and Chapman (1983) found that subsequent institutional commitment played a significant role in the persistence of two-year college freshmen, but their study is of little help since it only traces persistence withdrawal over a single year. Tentatively, what can be concluded from the present findings is that the long-term degree completion and persistence of women initially enrolling in two-year institutions is generally independent of their degree of commitment/satisfaction with the last undergraduate institution attended. Conversely, corresponding institutional commitment/satisfaction would appear to play a substantially more positive role in male degree persistence and completion. Since such differential findings are so at odds with the theoretical expectations of the model, however, their validity would be enhanced through replication.

While only a few student background characteristics had significant direct effects on student persistence, several of these variables (e.g., ethnicity, secondary school social and academic accomplishment) significantly influenced subsequent variables in the model which, in turn, directly influenced persistence. Thus, a substantial part of their influence on

persistence was indirect, transmitted through intervening variables in the model such as academic integration, social integration and subsequent institutional commitment/satisfaction. This trend, however, was somewhat more pronounced for men than for women.

Because the core concept of social integration had consistently significant direct effects on both measures of persistence for men and women, an additional analysis was conducted to determine which specific types of social integration were most important. When the influence of all other predictors in the model was controlled statistically, the types of social integration with significant positive associations with persistence differed somewhat by sex. For men, knowing a faculty member or administrator personally had by far the strongest positive associations with both persistence measures. This finding is consistent with earlier research using single institution samples which indicates that the frequency and quality of informal interaction with faculty has a unique, positive influence on student persistence (Pascarella and Terenzini, 1977, 1980; Spady, 1971; Terenzini and Pascarella, 1977, 1978). The present study thus provides additional evidence to suggest that the personal relationships students develop with faculty and staff are a potentially significant factor in their persistence/withdrawal behavior.

For women knowing a faculty member or administrator had significant zero-order correlations with each persistence measure, but these became non-significant when the influence of other variables in the model was taken into account. The types of social integration with the strongest significant partial associations with the two persistence measures for women represented

leadership activities (i.e., editing school publications or president of student organizations). Thus, it would appear that the types of institutional social integration which most enhance the degree persistence and completion of women are those which permit the exercise of their leadership skills. This trend, however, is not as pronounced as the importance of knowing faculty and staff was for the male.[6]

Sample

Footnotes

1. On all scales where the individual items were on a different metric (i.e., socioeconomic status, secondary school achievement, academic integration), a two-step procedure was used to develop scores. First, all items were standardized; and second, the score for each person was obtained by summing across standardized items. A constant of 20 was added to eliminate negative scores. Thus, the mean score on these variables will be more a reflection of the constant added than the raw score.
2. Clearly these two key measures in Tinto's model suffer from brevity and a degree of superficiality, dictated in large measure by available data. For example the operational definition of academic integration is essentially academic performance. Tinto's concept of academic integration included grades, but also encompassed the fuller notion of student intellectual development. Similarly the social integration measure assessed a number of activities which, with one exception ("knew a professor"), occur quite rarely (e.g., editor of a publication, president of a student organization). Absent from this measure were assessments of the quality and impact of interactions with peers and faculty. Although the terms academic and social integration were used in the study for purposes of consistency with the nomenclature of the model, it is recognized that these are incomplete assessments of Tinto's concepts.
3. Because of the possibility of selective, non-representative response on the follow-up survey, the Cooperative Institutional Research Program data contain a weighting algorithm to adjust for response bias. All analyses reported in the paper are based on weighted sample estimates adjusted to

actual sample size to obtain correct degrees of freedom. Parallel sets of analyses were conducted with weighted and unweighted samples. Although there were only trivial differences in the results, the weighted estimates are reported.

4. Multiple regression requires the equivalence of variances for the dependent variable for various levels of an independent variable (i.e., homoscedasticity). Because the dependent variable is a dichotomy (persisters and withdrawals), this assumption is violated. However, recent literature (Goodman, 1976) suggests that multiple regression results are quite robust with respect to a skewed, dichotomous dependent variable, particularly when the percentages are as nearly equal as in this study (i.e., 70% to 30% or more).
5. Additional evidence for this is suggested by the relative variance increments in persistence associated with precollege variables (i.e., background traits and initial commitments) and college experience variables (i.e., academic integration, social integration and institutional commitment/satisfaction II). A series of hierarchical analyses conducted according to the causal sequence of the model entered these variables in sets. The eleven precollege measures were entered first, followed by the three college experience measures. For degree persistence precollege traits alone were associated with an R^2 of .063 for men and .062 for women. The corresponding R^2 increases associated with the addition of the college experience variables to the equations were .134 for men and .091 for women, respectively. For degree completion the R^2 increments for precollege variables were .113 for men and .144

for men and .144 for women, while the R^2 increases associated with the college experience measures were .141 for men and .084 for women.

6. This study is limited in several ways which should be kept in mind when interpreting the findings. First, it has the basic limitation of nearly all secondary analyses. Specifically, the original data may have been collected for purposes quite different than those of the individual conducting secondary analyses. In this sense we were limited in our operational definitions of the constructs in Tinto's model by the actual data existing in the CIRP tapes. While a valuable data base in its own right, the CIRP data permitted operational definitions of constructs in Tinto's model which should be considered only the best available approximations from the existing data of what Tinto had in mind. More extensive, in-depth, operational definitions may have provided for a better estimation of the predictive validity of Tinto's constructs.

   A second, and related limitation of the study derives from the fact that the CIRP data had only one follow-up over the nine-year period of the study. Thus, elements of a number of the model's constructs relating to the student's experience of college (e.g., social integration, academic integration and institutional commitment/satisfaction II) were recalled retrospectively. Obviously, such retrospective assessments may weaken the reliability of the constructs measured and increase the ex post facto nature of the investigation.

   An additional, related limitation of the study is that the CIRP data assessed the student's experience of college only for the last institution attended. For some students this was a four-year institution to which

they transfered, while for others it was the two-year college in which they initially enrolled. For such concepts as social integration the mere fact of transfering from a two-year to a more traditional four-year college may have provided substantially greater opportunities for social involvement. Thus, one alternative hypothesis for the findings is that social integration was positively associated with student persistence in this study primarily because it reflected the fact that students who persisted after, or completed the bachelor's degree had to transfer from two-year colleges to institutions with increased opportunities for social involvement and participation.

To test this hypothesis we conducted an additional analysis which selected only those students who attended at least two institutions. This eliminated students who dropped out of post-secondary education without progressing beyond the two-year college in which they initially enrolled. Regression of the two persistence measures on the variables of the model yielded results which differed little from those shown in equations 15 and 16 in Tables 2 and 3. The significant direct effects of academic integration remained unchanged and the direct effects of social integration were essentially unchanged in significance and magnitude in three of the four equations. Only in the prediction of male degree persistence was the alpha level for social integration greater than .05 ($p < .07$). Such evidence suggests that the positive influence of social integration on degree persistence and degree completion is not simply a function of transfer from two-year institutions to more traditional institutions characterized by increased opportunities for social involvement.

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Table 1

Means, Standard Deviations, and Intercorrelations among Variables*

	Variable	Men M	Men SD	Women M	Women SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Age	3.53	1.14	3.32	.97		-13	-06	-12	11	09	-11	03	52	-06	06	-01	-01	00	01	-01
2.	Secondary School Achievement	18.63	1.81	19.65	1.76	-05		17	-01	13	07	12	04	02	23	-16	12	47	14	21	30
3.	Secondary School Social Accomplishment	5.84	.89	5.61	.89	-00	16		-14	05	-02	-07	-04	-00	17	04	34	10	05	06	06
4.	SES	19.39	1.50	19.44	1.50	-23	04	04		-24	-11	38	07	-09	05	-21	-10	01	00	05	05
5.	Financial Concern	1.87	.61	1.89	.59	-02	-04	-04	-38		27	-15	05	12	09	05	06	08	-01	01	-01
6.	Work Expectations	3.16	.83	3.03	.94	-19	06	-09	-09	33		-06	10	08	09	-17	-02	-02	-10	-00	-02
7.	Ethnicity	.68	.47	.69	.46	-12	35	13	36	-19	01		06	-09	-04	-13	-02	12	15	03	06
8.	Expected Major	.20	.40	.30	.46	-14	10	-05	08	02	01	09		-01	07	-04	07	02	03	-03	-01
9.	Marital Status	1.03	.17	1.05	.21	65	06	-05	-07	-04	-18	-06	-11		-01	01	-07	07	06	05	04
10.	Goal Commitment I	3.69	.75	3.44	.62	-07	03	-01	01	02	03	-05	16	-00		-01	10	10	01	11	08
11.	Institutional Commitment I	1.04	1.28	1.15	1.39	12	-16	-01	-18	-04	-22	-14	-01	08	-00		-03	-08	03	-09	-16
12.	Social Integration	5.85	.78	5.80	.74	-10	04	21	05	-04	01	04	-01	-03	-01	02		15	14	22	23
13.	Academic Integration	19.40	1.50	20.09	1.72	-02	44	04	12	-09	-04	29	13	09	-02	-08	22		29	34	38
14.	Institutional Commitment/ Satisfaction II	2.44	.61	2.44	.62	14	11	-02	-10	01	00	07	00	06	-06	02	07	10		28	31
15.	Degree Persistence	.68	.47	.70	.46	-04	13	12	13	-01	-03	09	09	05	07	-08	23	31	08		74
16.	Degree Completion	.53	.50	.53	.50	-05	28	15	14	-01	-06	23	10	07	06	-09	20	39	05	70	

*Matrix above the diagonal for men, below the diagonal for women, decimals omitted from correlations.

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Table 2

Structural Equations for Men[1]

	Variable	10	11	12	13	14	15	16
1.	Age	-.039 (-.026)	.039 (.044)	.064 (.043)	.033 (.044)	-.016 (-.009)	.006 (.003)	.011 (.005)
2.	Secondary School Academic Achievement	.200** (.083)	-.156** (-.111)	.049 (.021)	.452** (.374)	.011 (.004)	.056 (.015)	.158** (.043)
3.	Secondary School Social Accomplishment	.145** .123)	.029 (.042)	.316** (.278)	.032 (.053)	-.017 (-.012)	-.037 (-.020)	-.051 (-.029)
4.	SES	.114* (.057)	-.196** (-.169)	-.083 (-.043)	-.006 (-.006)	-.041 (-.017)	.080 (.025)	.051 (.017)
5.	Financial Concern	.055 (.067)	.071 (.149)	.036 (.046)	.041 (.099)	-.009 (-.009)	-.021 (-.016)	-.043 (-.035)
6.	Work Expectations	.065 (.059)	-.200** (-.308)	-.049 (-.046)	-.066 (-.118)	-.087 (-.064)	.016 (.009)	-.010 (-.006)
7.	Ethnicity	-.092 (-.148)	-.029 (-.080)	.018 (.030)	.081 (.259)	.136** (.178)	-.065 (-.065)	-.050 (-.054)
8.	Expected Major	.053 (.099)	-.001 (-.004)	.079 (.153)	.000 (.000)	.021 (.033)	-.062 (-.073)	-.038 (-.047)
9.	Marital Status	-.005 (-.022)	-.022 (-.162)	-.108* (-.483)	.049 (.418)	.074 (.259)	.038 (.103)	.020 (.058)
10.	Goal Commitment I			.042 (.043)	.001 (.003)	-.009 (-.007)	.063 (.039)	-.014 (-.009)
11.	Institutional Commitment I			-.062 (-.037)	-.016 (-.018)	.049 (.023)	-.047 (-.017)	-.118* (-.045)
12.	Social Integration					.114* (.089)	.168** (.101)	.176** (.113)

Table 2 (cont.)

	Variable	10	11	12	13	14	15	16
13.	Academic Integration					.246** (.101)	.231** (.072)	.223** (.074)
14.	Institutional Commitment/Satisfaction II						.196** (.150)	.211** (.172)
15.	Degree Persistence							
16.	Degree Completion							
	R^2	.096	.111	.142	.234	.122	.197	.254

[1] $N = 418$; Top number is the standardized weight; number in parentheses is the metric or unstandardized weight

*$p < .05$

**$p < .01$

Table 3

Structural Equations for Women[1]

Variable	10	11	12	13	14	15	16
1. Age	-.108 (-.069)	.009 (.012)	-.151* (-.116)	-.036 (-.063)	.192** (.123)	-.034 (-.016)	-.083 (-.043)
2. Secondary School Academic Achievement	.030 (.010)	-.133* (-.105)	.000 (.000)	.382** (.373)	.084 (.030)	-.007 (-.002)	.085 (.024)
3. Secondary School Social Accomplishment	.010 (.007)	.002 (.003)	.214** (.180)	-.036 (-.069)	-.067 (-.047)	.087 (.045)	.094* (.053)
4. SES	.012 (.005)	-.200** (-.186)	.021 (.010)	.043 (.049)	-.106 (-.044)	.121* (.037)	.067 (.022)
5. Financial concern	-.003 (-.003)	-.056 (-.132)	-.039 (-.049)	-.009 (-.026)	-.014 (-.015)	.073 (.057)	.093 (.079)
6. Work Expectations	.020 (.014)	-.205** (-.303)	.045 (.036)	-.056 (-.102)	.012 (.008)	-.029 (-.014)	-.080 (-.043)
7. Ethnicity	-.090 (-.120)	-.032 (-.095)	-.012 (-.020)	.137** (.508)	.081 (.109)	-.034 (-.034)	.089 (.096)
8. Expected Major	.182** (.220)	.029 (.089)	-.007 (-.011)	.083 (.313)	.014 (.018)	.043 (.043)	.033 (.037)
9. Marital Status	.084 (.250)	.035 (.230)	.082 (.292)	.097 (.797)	-.077 (-.228)	.064 (.141)	.112 (.268)
10. Goal Commitment I			-.016 (-.020)	-.035 (-.097)	-.047 (-.047)	.065 (.048)	.061 (.050)
11. Institutional Commitment I			.047 (.025)	-.006 (-.008)	.012 (.005)	-.032 (-.010)	-.046 (-.016)
12. Social Integration					.091 (.076)	.149** (.091)	.103* (.069)

Table 3 (cont.)

Variable	10	11	12	13	14	15	16
13. Academic Integration					.041 (.015)	.257** (.069)	.280** (.082)
14. Institutional Commitment/ Satisfaction II						.043 (.032)	.021 (.017)
15. Degree Persistence							
16. Degree Completion							
R^2	.040	.113	.061	.236	.063	.153	.228

[1] N = 407; Top number is the standardized weight; number in parentheses is the metric or unstandardized weight

*p < .05
**p < .01

Table 4

Standardized (SIE) and Metric (MIE) Indirect Effects on Degree Persistence and Degree Completion

	Degree Persistence						Degree Completion					
	Men			Women			Men			Women		
Variable	SIE	MIE	t	SIE	MIE	t	SIE	MIE	t	SIE	MIE	t
Age	.014	.006	.61	-.030	-.014	-1.28	.014	.006	.60	-.028	-.014	-1.22
Secondary School Academic Achievement	.160	.041	4.97**	.108	.028	3.95**	.154	.043	4.82**	.117	.033	4.44**
Secondary School Social Involvement	.074	.039	2.97**	.021	.011	1.13	.064	.036	2.52*	.012	.006	.63
SES	-.007	-.002	-.32	.015	.005	.77	-.004	-.001	-.16	.021	.007	1.07
Financial Concern	.017	.013	.83	-.008	-.006	-.46	.008	.006	.36	-.005	-.004	-.29
Work Expectations	-.030	-.017	-1.34	-.001	-.000	-.04	-.022	-.013	-.98	-.001	-.001	-.06
Ethnicity	.048	.048	2.20*	.033	.033	1.76	.059	.063	2.61**	.036	.039	1.95
Expected Major	.023	.027	1.22	.029	.029	1.69	.020	.025	1.02	.030	.032	1.79
Marital Status	.008	.022	.37	.038	.083	1.83	.010	.029	.43	.037	.088	1.83
Goal Commitment I	.007	.004	.36	-.014	-.010	-.95	.007	.005	.36	-.013	-.010	-.90
Institutional Commitment I	-.007	-.002	-.35	.006	.002	.41	-.006	-.003	-.33	.003	.001	.23
Social Integration	.022	.013	1.97*	.004	.002	.80	.024	.016	2.02*	.002	.001	.45
Academic Integration	.048	.015	3.07*	.002	.001	.56	.052	.017	3.25**	.001	.000	.39
Institutional Commitment/Satisfaction II	-	-	-	-	-	-	-	-	-	-	-	-

*p < .05
**p < .01

Table 5

Simple Correlations (r), Partial Correlations (pr), and Regression Weights (Beta, b) with Degree Persistence and Completion for Each Type of Social Integration[1]

	Degree Persistence						Degree Completion					
	Men			Women			Men			Women		
	r	pr	Beta (b)	r	pr	Beta (b)	r	pr	Beta (b)	r	pr	Beta (b)
1. Know at least one professor or administrator personally	.231	.165**	.150** (.142)	.164	.091	.073 (.068)	.268	.200**	.174** (.177)	.117	.041	.026 (.026)
2. President of one or more student organizations	.100	.046	.018 (.027)	.191	.120*	.089 (.152)	.157	.111*	.076 (.122)	.172	.098	.068 (.126)
3. Major part in a play	.059	.056	.039 (.118)	.077	.049	.031 (.069)	-.032	-.031	-.044 (-.143)	.032	.004	-.002 (-.006)
4. Win a varsity letter	.056	.074	.068 (.104)	.017	-.000	.002 (.005)	.019	.033	.026 (.043)	.070	.041	.038 (.095)
5. Edit the school paper, yearbook, or literary magazine	-.001	-.003	-.006 (-.019)	.093	.099*	.072 (.158)	.001	-.004	-.009 (-.032)	.104	.113*	.087 (.208)

[1]Partial correlations (pr) are controlling for all other main effects variables in the model. Beta (and b) are controlling for all other variables in the model plus each of the other types of social integration

*p < .05
**p < .01

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